CLAIMS

What is claimed is:

1. A bi-directional communications module configured for propagating transmission and reception of optical data along dual optical cables, the module comprising:

a first transmitter configured for transmitting data on a first wavelength channel onto a first optical fiber;

a first receiver configured for receiving data on a second wavelength channel from the first optical fiber;

a second transmitter configured for transmitting data on the second wavelength channel on a second optical fiber; and

a second receiver configured for receiving data on the first wavelength channel from the second optical fiber.

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2. The bi-directional communications module set forth in claim 1, wherein the first transmitter and the first receiver comprise a first bi-directional transceiver and the second transmitter and the second receiver comprise a second bi-directional transceiver.

3. The bi-directional communications module set forth in claim 2, wherein:

the first bi-directional transceiver further comprises a first beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel; and

the second bi-directional transceiver further comprises a second beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel.

4. The bi-directional communications module set forth in claim 1, wherein the module is compatible with small form factor pluggable (SFP) standards.

5. The bi-directional communications module set forth in claim 1, wherein the first receiver comprises a photodetector.

6. The bi-directional communications module set forth in claim 1, wherein the first transmitter comprises a laser selected from the group consisting of a distributed feedback laser and a Fabry Perot laser.

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7. The bi-directional communications module set forth in claim 1, wherein the first wavelength channel and the second wavelength channel are of sufficiently different wavelengths to prevent the receivers from experiencing optical crosstalk due to internal reflection from the outgoing optical signals.

8. The bi-directional communications module set forth in claim 1, further comprising first and second duplex connectors that are configured to mate with connectors affixed to the first optical fiber and the second optical fiber.

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9. A bi-directional communications module configured for propagating transmission and reception of optical data along dual optical cables, the module comprising:

a first bi-directional transceiver, the first bi-directional transceiver comprising:

a first transmitter configured for transmitting data on a first wavelength channel; and

a first receiver configured for receiving data on a second wavelength channel; and

a second bi-directional transceiver, the second bi-directional transceiver comprising:

a second transmitter configured for transmitting data on the second wavelength channel; and

a second receiver configured for receiving data on the first wavelength channel.

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10. The bi-directional communications module set forth in claim 9, wherein:

the first bi-directional transceiver further comprises a first beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel; and

the second bi-directional transceiver further comprises a second beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel.

11. The bi-directional communications module set forth in claim 9, wherein the module is compatible with small form factor pluggable (SFP) standards.

12. The bi-directional communications module set forth in claim 9, wherein the first wavelength channel and the second wavelength channel are of sufficiently different wavelengths to prevent the receivers from experiencing optical crosstalk due to internal reflection from the outgoing optical signals.

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13. An optical system for propagating transmission and reception of optical data along dual optical cables, the system comprising:

a first bi-directional communications module, comprising:

a first bi-directional transceiver, the first bi-directional transceiver comprising:

a first transmitter configured for transmitting data along a first wavelength channel; and

a first receiver configured for receiving data along a second wavelength channel; and

a second bi-directional transceiver, the second bi-directional transceiver comprising:

a second transmitter configured for transmitting data along the second wavelength channel;

a second receiver configured for receiving data along the first wavelength channel; and

a second bi-directional communications module, comprising:

a third bi-directional transceiver, the third bi-directional transceiver comprising:

a third transmitter configured for transmitting data along a first wavelength channel; and

a third receiver configured for receiving data along a second wavelength channel; and

a fourth bi-directional transceiver, the fourth bi-directional transceiver comprising:

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a fourth transmitter configured for transmitting data along the second wavelength channel;

a fourth receiver configured for receiving data along the first wavelength channel; and

a first optical fiber in optical communication with each of the first transceiver and the fourth transceiver; and

a second optical fiber in optical communication with each of the second transceiver and the third transceiver.

14. The optical system set forth in claim 13, wherein:

the first bi-directional transceiver further comprises a first beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel; and

the second bi-directional transceiver further comprises a second beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel.

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15. A method for propagating transmission and reception of optical data along dual optical cables, comprising:

at a first optical module, transmitting a first optical signal over a first wavelength channel down a first optical fiber in a first direction and transmitting a second optical signal over a second wavelength channel down a second optical fiber in the first direction; and

at a second optical module, transmitting a third optical signal over the second wavelength channel down the first optical fiber in a second direction and transmitting a fourth optical signal over the first wavelength channel down the second optical fiber in the second direction.

16. The method set forth in claim 15, wherein the first optical module and the second optical module are each compatible with small form factor pluggable (SFP) standards.

17. The method set forth in claim 15, wherein the first wavelength channel and the second wavelength channel are of sufficiently different wavelengths to prevent receivers in each optical module from experiencing optical crosstalk due to internal reflection from the outgoing optical signals.

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18. A method for increasing data transmission capacity on an existing optical network comprising dual optical cables, the method comprising:

providing a legacy optical system that comprises first and second optical cables, each of the first and second optical cables comprising connectors at each terminus of the optical cables;

connecting a first bi-directional communications module on adjacent ends of each of the first and second optical cables and connecting a second bi-directional communications module to the opposing adjacent ends of each of the first and second optical cables, the first bi-directional communications module comprising:

connectors that are compatible with the connectors on the first and second optical cables;

a first transmitter configured for transmitting data on a first wavelength channel onto the first optical cable;

a first receiver configured for receiving data on a second wavelength channel from the first optical cable;

a second transmitter configured for transmitting data on the second wavelength channel on the second optical cable; and

a second receiver configured for receiving data on the first wavelength channel on the second optical cable.

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19. The method set forth in claim 18, wherein the first transmitter and the first receiver comprise a first bi-directional transceiver and the second transmitter and the second receiver comprise a second bi-directional transceiver.

20. The method set forth in claim 18, wherein:

the first bi-directional transceiver further comprises a first beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel; and

the second bi-directional transceiver further comprises a second beam splitter for reflecting only one of the first or second wavelength channels while permitting passage therethrough of the non-reflected wavelength channel.

21. A module as in claim 18, wherein the first bi-directional module is compatible with small form factor pluggable (SFP) standards.

22. The method set forth in claim 18, wherein the first wavelength channel and the second wavelength channel are of sufficiently different wavelengths to prevent the receivers from experiencing optical crosstalk due to internal reflection from the outgoing optical signals.

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